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28990 Investigation of Environmental
Change Pattern in Japan

(Investigation of Variations in
the Prominent Oceanic Current,
Kuroshio)

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Quarterly Report

(E76-10363) INVESTIGATION OF ENVIRONMENTAL
CHANGE PATTERN IN JAPAN. INVESTIGATION OF
VARIATIONS IN THE PROMINENT OCEANIC CURRENT,
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Investigation of Variations in the
Prominent Oceanic Current, Kuroshio

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1. Introduction

This report is a continuation of the previous one (February 3, 1976). This time, however, more precise comparison was made between MSS data of LANDSAT-2 and sea truth. Especially, the vortex pattern found off Shiono Misaki was closely investigated in relation to the variation of the Kuroshio about the time of the data acquisition.

2. Techniques

As in the case of the previous report, images on a 70mm bulk film (black-and-white) were mainly used. Partially, however, digital color image prints were prepared for trial, from which a preliminary result was obtained.

3. Accomplishments

Aiming at the vortex in the southern offing of Shiono Misaki, sea truth data in and around the vortex area were collected. Distribution charts of surface salinity, transparency and water color off Shiono Misaki were then drawn (Fig. 4, 5 and 6). Along with these charts, two current charts based on GEK observations were prepared to grasp the condition of the flow of the Kuroshio, one of them (Fig. 1) showing the state of the current before the date on which the MSS data were taken, while the other (Fig. 2) after that date.

Comparing the MSS data with these charts, investigation was made on the forming process of the vortex. Furthermore, based on the prints, a schematic chart of the sea condition on that date was drawn (Fig. 3).

4. Significant Results

Certain analysis on the cause of formation of the vortex has resulted in recognition that variation of sea conditions to a considerable extent was occurred in this locality before and after the date when the MSS data were taken.

(1) Current Condition

Fig. 1 shows the condition of the Kuroshio flow during the period from mid-August to early September, about half a month before the date. Fig. 2 shows the condition in mid-September, right after the date.

According to Fig. 1, the Kuroshio was flowing southeastward in the offing of Shiono Misaki, and the area (bounded by a dashed line) in which the vortex was found had a complicated current condition enclosed by three different systems (indicated as A, B and C).

According to Fig. 2, however, the Kuroshio was flowing close to Shiono Misaki, so that the above-mentioned complicated sea condition is not found, and the location of this area falls in the marginal zone of the turning area of the Kuroshio.

From these conditions, it can be concluded that the vortex was formed during the period when the stream axis of the Kuroshio was gradually approaching Shiono Misaki.

(2) Temperature Condition

The sea surface temperatures in the area obtained in this period were found to be nearly homogenous, having the values of 27.3° to 27.8°C.

(3) Water Type Condition

From the print showing Shiono Misaki and its digital color image print, a schematic chart was drawn in order to show sea conditions including the vortex, distribution of coastal waters and hypothetical stream line of the Kuroshio. According to the chart, the water area having a different color seems to be of coastal water, and is extending in Ise Bay as well as along the east coast of Kii Peninsula as far as Shiono Misaki. Also, it narrowly stretches offshore from Shiono Misaki to join the vortex. From these features, it can be considered that the coastal water and the offshore vortex are from the same origin.

a. Transparency (Fig. 4); Water Color (Fig. 5)

Transparency of the water was better in the area on the east side of Shiono Misaki than on the west side, the values being 20 to 27m against 13m.

As for the water color in the same areas, a value of 2 was obtained on the east side and 4 on the west side of the peninsula, while 3 in the area in-between.

b. Surface Salinity (Fig. 6)

Surface salinity distribution has a similar feature as in the cases of transparency and water color, having a considerably high value of 33.7‰ on the east side decreasing towards the west to become 32.00‰.

From these results, it is found that, as compared with western area, the area east side of the peninsula has a water of higher salinity and better transparency, and that it belongs to the counter-clockwise current associated with the large cold water mass off Enshu Nada. Thus, it can be considered that the coastal water is extending between the two areas on both sides of the peninsula.

5. Publications

No.

6. Problems

No.

7. Data Quality and Delivery

No.

8. Recommendations

No.

9. Conclusions

After the interpretation of the vortex pattern appearing on the MSS data by using sea truth data, it can be concluded that this vortex has been generated by its being separated from the coastal water due to the variation of the Kuroshio.

Such a small-scale vortex phenomenon has hardly been found through conventional shipboard observations, so that it is anticipated that MSS data will lead us to better data interpretation.

As to the distribution of coastal water and oceanic water appearing on the print "Ise", more precise identification of water mass will be carried out.

The analysis using CCT has just started. It is hopeful that it will enable us to make better interpretation of sea truth data.

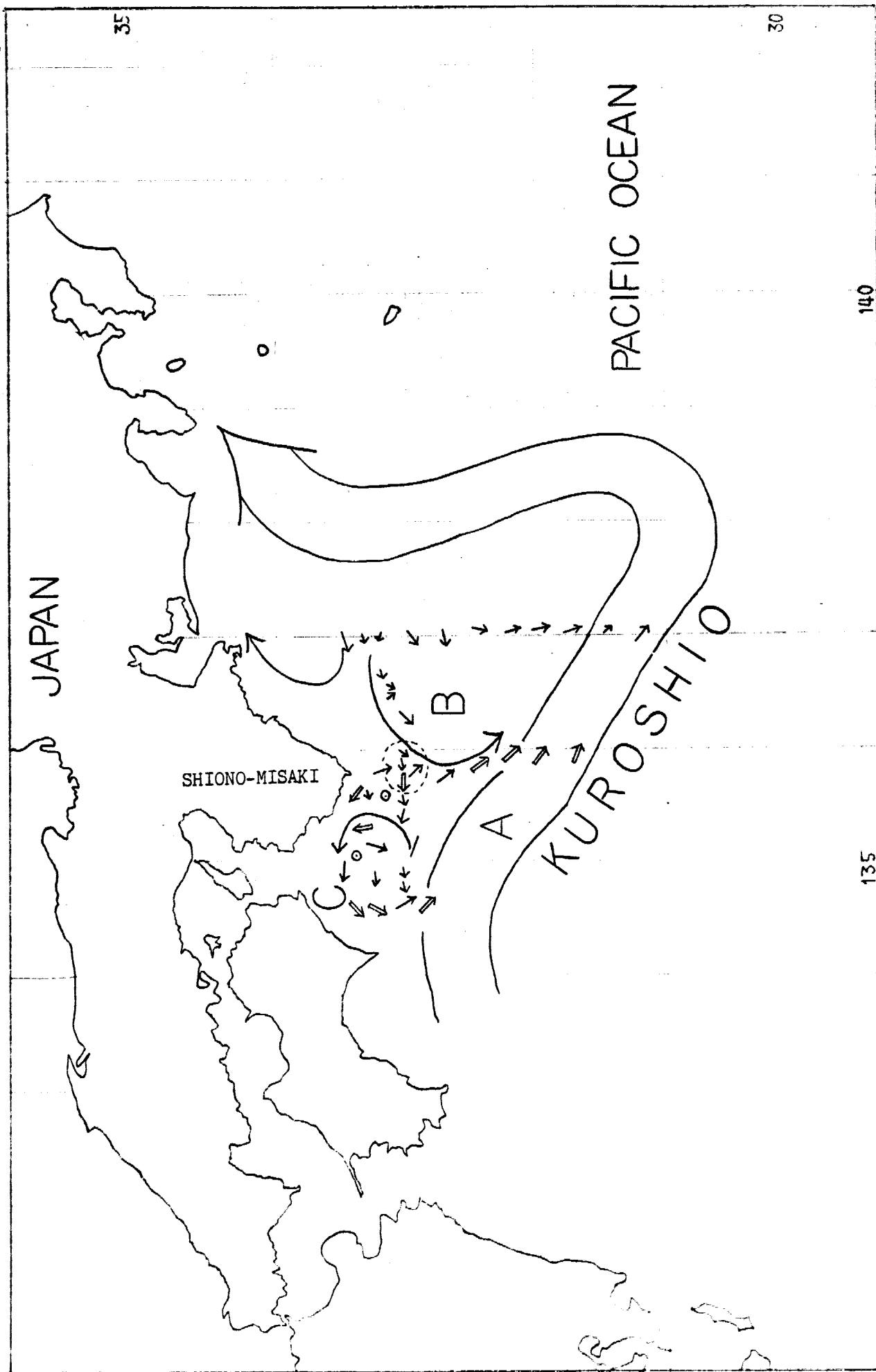


Fig.1 Surface Current by GEK, Aug.14-Sep.3,1975

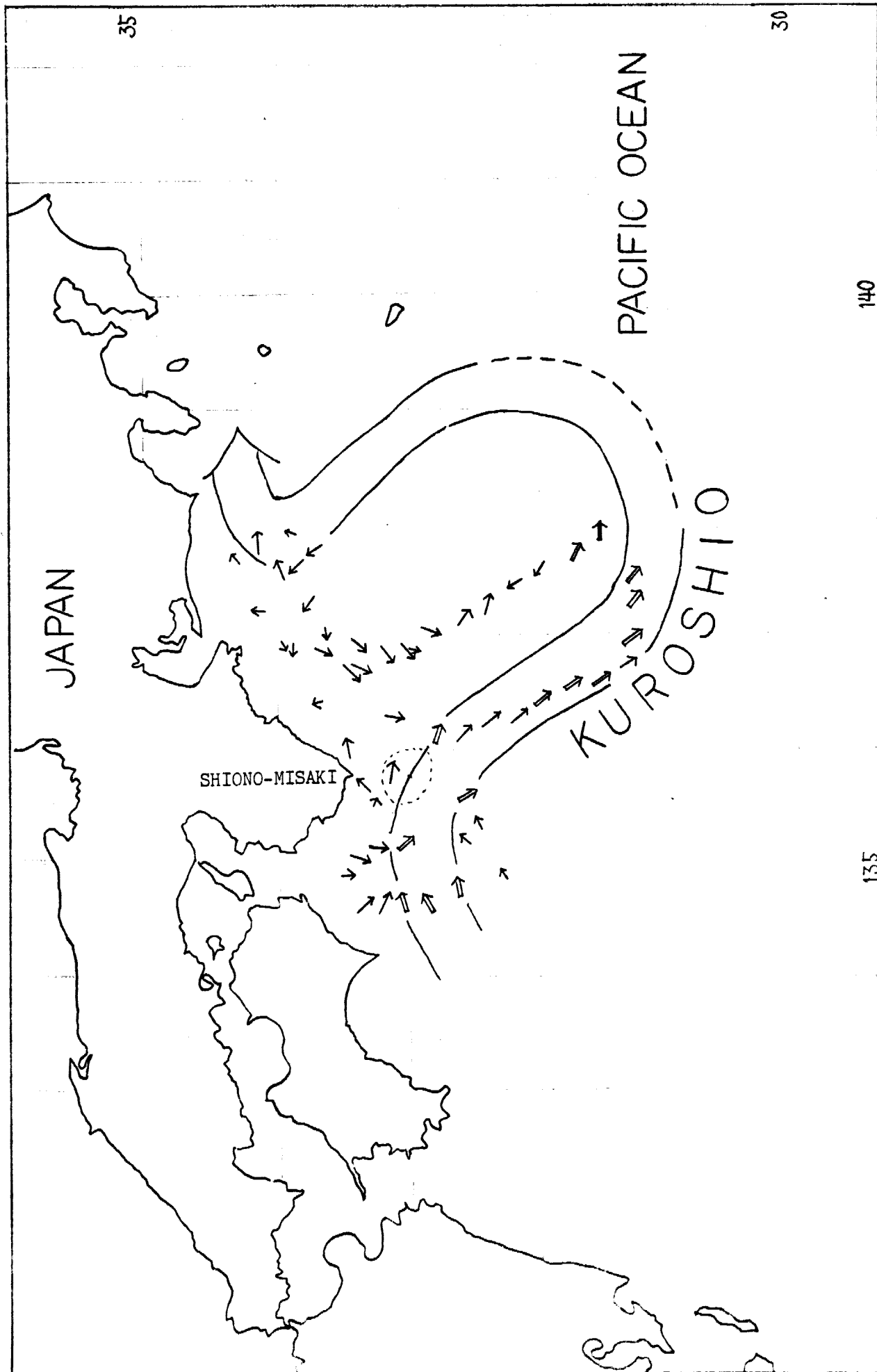


Fig.2 Surface Current by GEK, Sep.8-16,1975

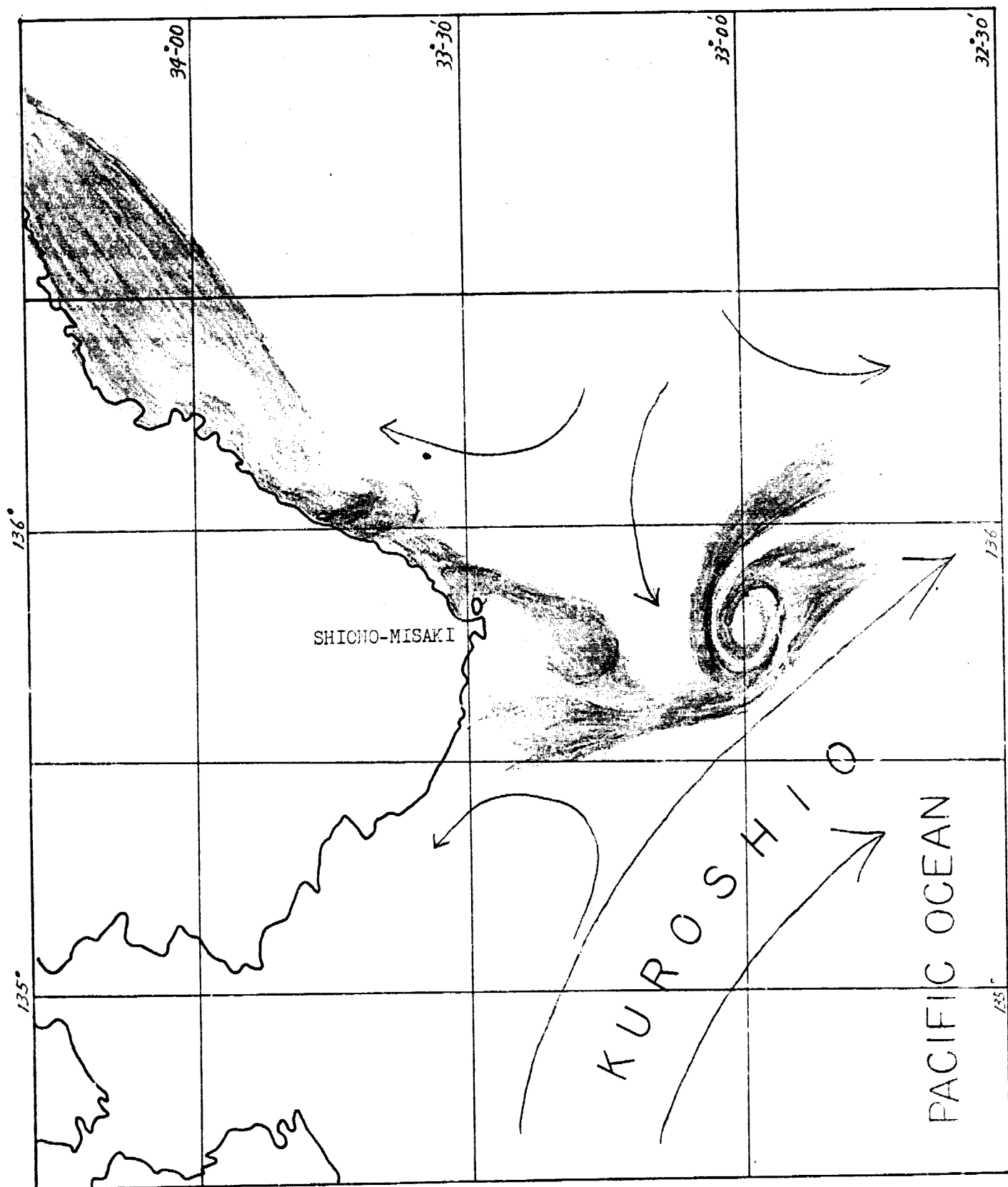


Fig.3 Hypothetical Stream Line of KUROSHIO

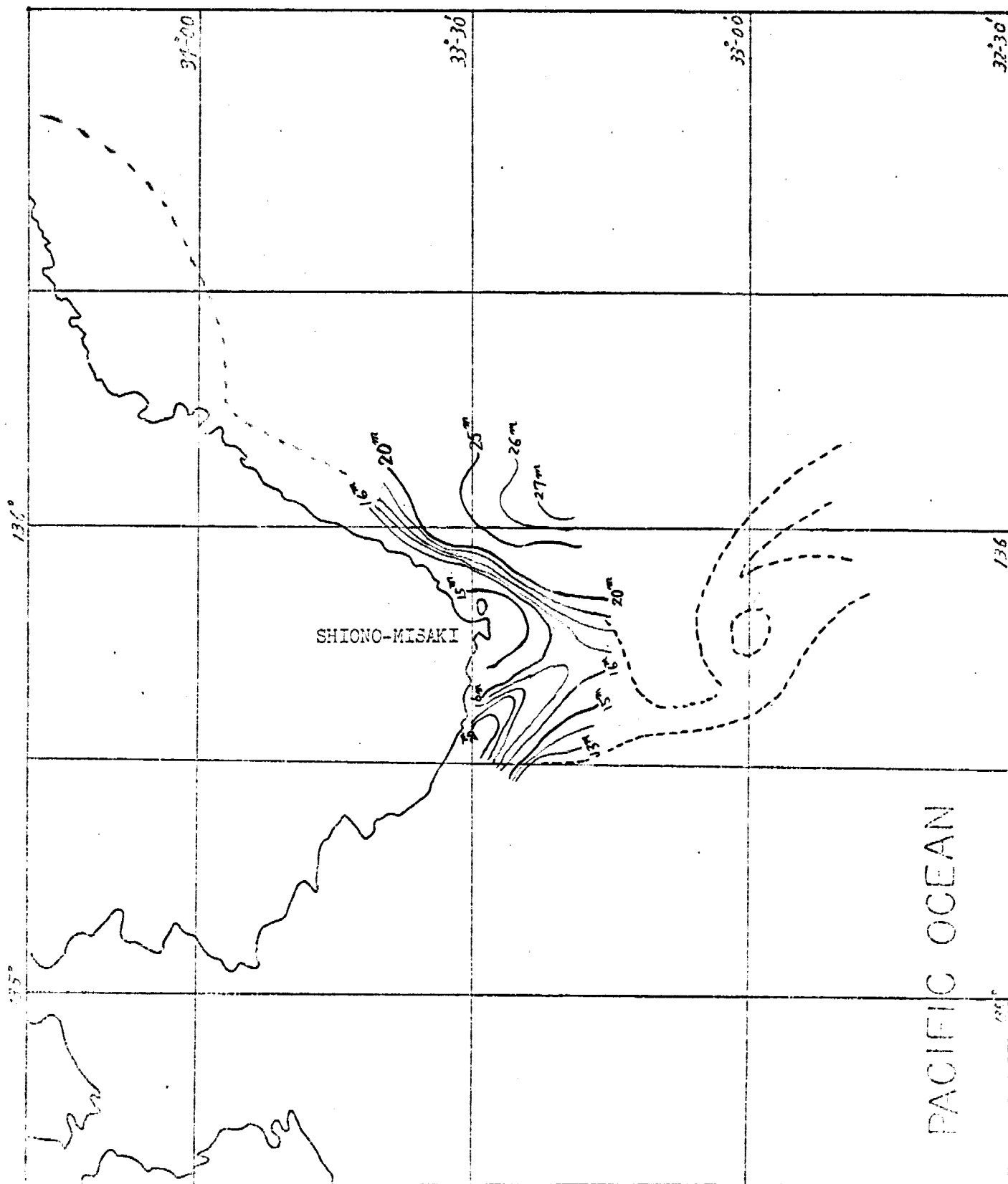


Fig.4 Transparency Distribution

Sept., 11th 12th, 1975 (m)

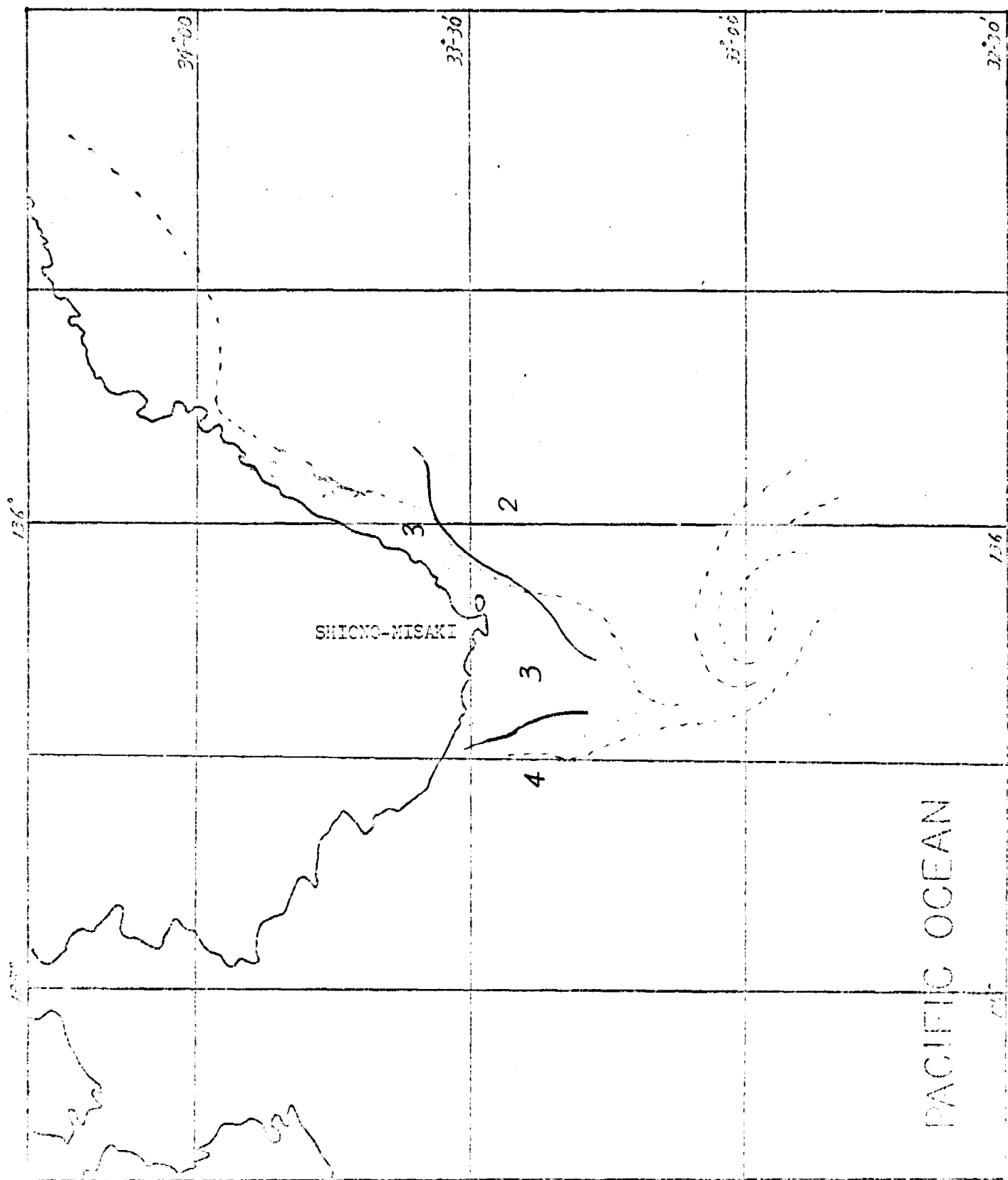


Fig.5 Water Color Distribution

Sept., 11th 12th, 1975

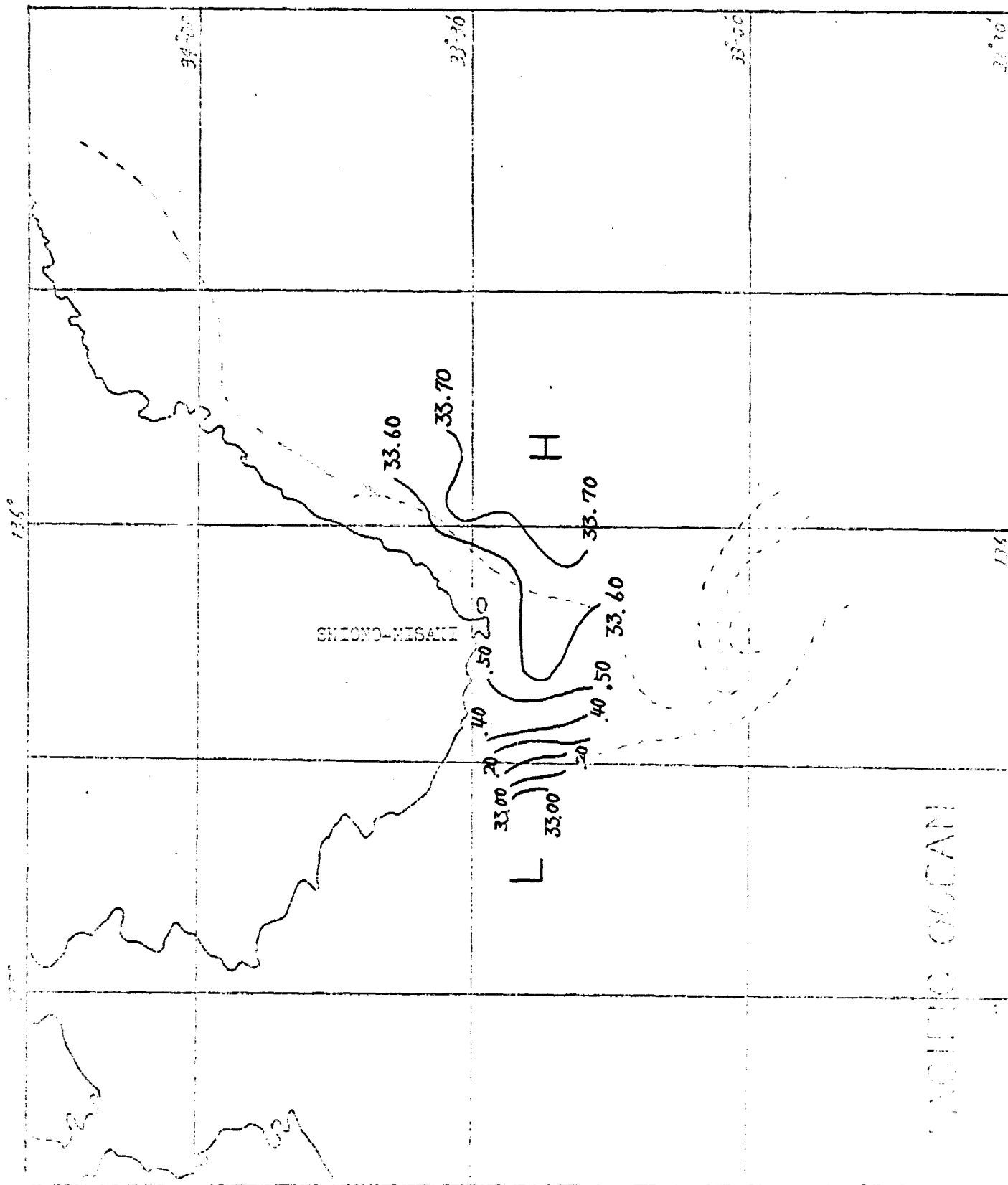


Fig.6 Surface Salinity

Sept., 11th 12th, 1975 (‰)